# ASOMIS, Phase I

Completed Technology Project (2018 - 2019)

## Project Introduction

The innovation of the **A**gricultural **SO**il **M**oisture and **I**rrigation **S**tatus (*A·SOM·IS*) platform is the development of operational and moderate resolution mapping and assessment of soil moisture, irrigation status (irrigated vs not), and crop water stress metrics at **field scale** for agricultural decision support tools. The platform focuses on utilization of Synthetic Aperture Radar (SAR) and blends SAR with Harmonized Landsat-8 and Sentinel-2 ("HLS") during Phase 1. During Phase 2 and forward, ASOMIS is geared at planned missions including Landsat-9, ECOSTRESS (ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station), and NASA-ISRO SAR (NISAR). This SBIR is directly relevant to NASA;

- Helps address a shortcoming of SMAP due to sensor failure
- Develops a direct pipeline between NASA and USDA programs ARS / SCAN / LTAR
- Supports development of ECOSTRESS and NISAR Missions
- Supports new NASA programs and Applied Sciences priorities (EOFSAC, agriculture, water resources)
- Helps bridge the gap of within existing Decision Support Tools with operational field scale metrics of soil moisture, irrigation status, and crop water stress
- Builds on prior success and lineage with growing Public Private Partnerships

**ASOMIS** uses operational Earth Observations and multi-scale fusion techniques to map soil moisture, irrigation status, and crop water stress metrics at moderate resolution (<30m) or "field scale". This is a huge gap in existing decision support tools and food security programs. Opportunities to leverage new operational Sentinel-1 C-band and planned L-band and P-band SAR missions (NISAR, BIOMASS) and thermal observations (ECOTRESS) are a game changer. Further, the ability to fuse Harmonized Landsat-8 and Sentinel-2 ("HLS") with MODIS / VIIRS for near daily monitoring of Evapotranspiration (ET) at moderate scale using cloud computing and robust fusion techniques has created an exciting concept for the agricultural community to advance field scale monitoring and assessment.

## Anticipated Benefits

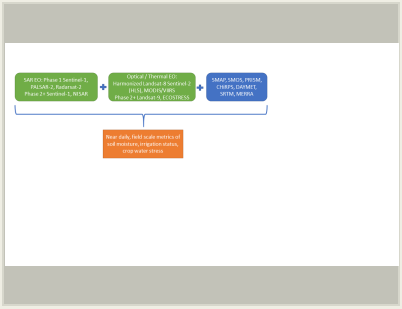
Drive models (LDAS)

Support NISAR and ECOSTRESS Missions

Support Applied Sciences

Support JPL and GSFC agenda

Supplement SMAP limitations



ASOMIS, Phase I

## Table of Contents

# ASOMIS, Phase I

Completed Technology Project (2018 - 2019)

Helps bridge the gap of within existing Decision Support Tools with operational field scale metrics of soil moisture, irrigation status, and crop water stress

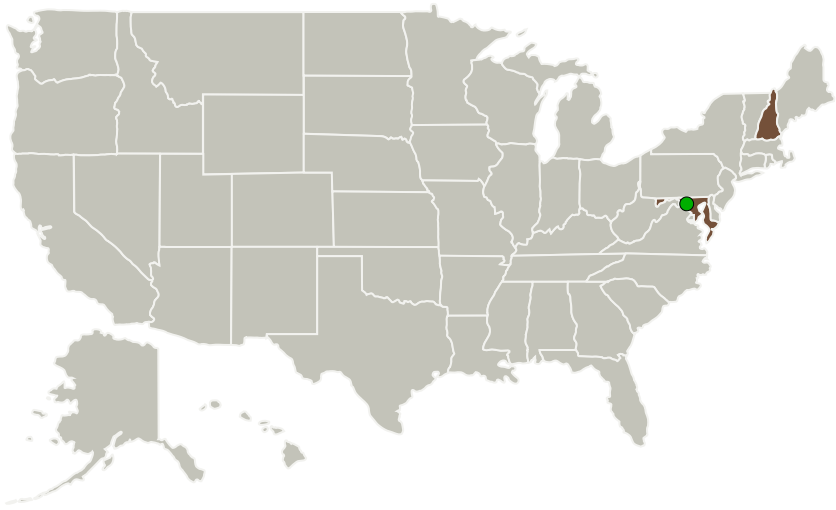
Develops a direct pipeline between NASA and USDA programs ARS / SCAN / LTAR

Support FEWSNET, EOFSAC, GEOGLAM and food security programs

Builds on prior success and lineage with growing Public Private Partnerships

Improve food security

### Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Applied Geosolutions, LLC | Lead Organization | Industry | Durham, New Hampshire |
| Goddard Space Flight Center(GSFC) | Supporting Organization | NASA Center | Greenbelt, Maryland |

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Applied Geosolutions, LLC

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

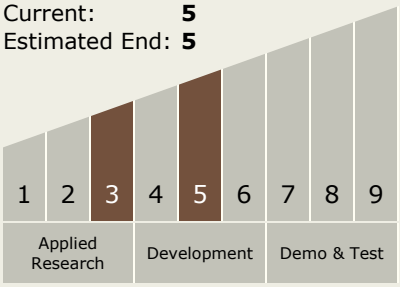
Carlos Torrez

**Principal Investigator:**

Nathan Torbick

## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



# ASOMIS, Phase I

Completed Technology Project (2018 - 2019)

| Primary U.S. Work Locations | |
|---|---|
| Maryland | New Hampshire |

## Project Transitions

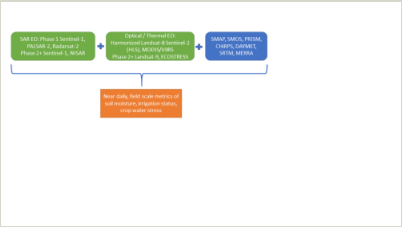
**July 2018:** Project Start

**February 2019:** Closed out

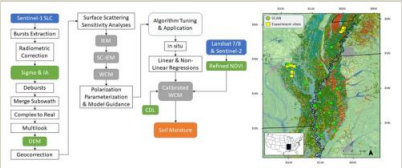
**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/140935)*

## Images



**Briefing Chart Image**
ASOMIS, Phase I
*(https://techport.nasa.gov/image/134778)*



**Final Summary Chart Image**
ASOMIS, Phase I
*(https://techport.nasa.gov/image/128760)*

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

## Target Destination

Earth